



SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT: Porro, Massimo

(ii) TITLE OF INVENTION: VACCINES FOR PREVENTION OF GRAM-NEGATIVE BACTERIAL INFECTIONS AND ENDOTOXIN RELATED DISEASES

(iii) NUMBER OF SEQUENCES: 45

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: Hedman, Gibson & Costigan
(B) STREET: 1185 Avenue of the Americas
(C) CITY: New York
(D) STATE: New York
(E) COUNTRY: USA
(F) ZIP: 10036

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Diskette, 3.50 inch, 1.44 Mb storage
(B) COMPUTER: IBM PS/2
(C) OPERATING SYSTEM: DOS
(D) SOFTWARE: Word Perfect 5.1

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: 09/124,280
(B) FILING DATE: July 29, 1998
(C) CLASSIFICATION:

(vii) PRIOR APPLICATION DATA:

(A) APPLICATION NUMBER:
(B) FILING DATE:

(viii) ATTORNEY/AGENT INFORMATION:

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(B) REGISTRATION NUMBER: 25,669
(C) REFERENCE/DOCKET NUMBER: 576-008

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (212) 302-8989
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(2) INFORMATION FOR SEQ ID NO:1:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:1:

Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
1				5						10

(3) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 30 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:2:

Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
1				5						10
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				15						20
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				25						30

(4) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 434 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:3:

Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
1				5						10
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				15						20
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				25						30
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				35						40
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				45						50
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				55						60
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				65						70
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				75						80
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				85						90
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				95						100
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				105						110
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				115						120

Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				125						130
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				135						140
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				145						150
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				155						160
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				165						170
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				175						180
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				185						190
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				195						200
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				205						210
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				215						220
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				225						230
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				235						240
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				245						250
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				255						260
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				265						270
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				275						280
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				285						290
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				295						300
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				305						310
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				315						320
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				325						330
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				335						340
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				345						350
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				355						360
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				365						370
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				375						380
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				385						390
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys
				395						400

Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	405	410
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	415	420
Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	Lys	425	430
Lys	Lys	Lys	Lys										

(5) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:4:

Lys	Asp	Lys	Asp	Lys	Asp	Lys	Asp	Lys	Asp	1	5	10
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	---	---	----

(6) INFORMATION FOR SEQ ID NO:5:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:5:

Lys	Phe	Lys	Phe	Lys	Phe	Lys	Phe	Lys	Phe	1	5	10
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	---	---	----

(7) INFORMATION FOR SEQ ID NO:6:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 7 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:6:

Lys	Phe	Leu	Lys	Lys	Thr	Leu	1	5
-----	-----	-----	-----	-----	-----	-----	---	---

(8) INFORMATION FOR SEQ ID NO:7:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 7 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:7:

Lys Phe Leu Lys Phe Leu Lys
1 5

(9) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:8:

Lys Phe Leu Lys Phe Leu Lys Phe Leu Lys
1 5 10

(10) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:9:

Arg Tyr Val Arg Tyr Val Arg Tyr Val
1 5

(11) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:10:

Lys Phe Phe Lys Phe Phe Lys Phe Phe Lys
1 5 10

(12) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:11:

Lys Leu Leu Lys Leu Leu Lys Leu Leu
1 5

(13) INFORMATION FOR SEQ ID NO:12:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:12:

Lys	Lys	Lys	Lys	Lys	Lys	Phe	Lys	Phe	Lys
1				5					10

(14) INFORMATION FOR SEQ ID NO:13:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:13:

Cys	Lys	Cys	Lys	Cys	Lys	Cys	Lys	Cys	Lys	Cys
1				5					10	

(15) INFORMATION FOR SEQ ID NO:14:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 6 amino acids
- (B) TYPE: amino acid
- (D) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:14:

Cys	Lys	Phe	Lys	Lys	Cys
1				5	

(16) INFORMATION FOR SEQ ID NO:15:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:15:

Lys	Phe	Lys	Cys	Lys	Phe	Lys	Phe	Lys	Cys
1				5					10

(17) INFORMATION FOR SEQ ID NO:16:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid

- (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:16:
- | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Leu | Lys | Cys | Lys | Leu | Lys | Leu | Lys | Cys |
| 1 | | | | 5 | | | | | 10 |
- (18) INFORMATION FOR SEQ ID NO:17:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:17:
- | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Arg | Thr | Arg | Cys | Arg | Phe | Lys | Arg | Arg | Cys |
| 1 | | | | 5 | | | | | 10 |
- (19) INFORMATION FOR SEQ ID NO:18:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:18:
- | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Lys | Cys | Lys | Phe | Lys | Lys | Phe | Lys | Cys | Lys |
| 1 | | | | 5 | | | | | 10 |
- (20) INFORMATION FOR SEQ ID NO:19:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:19:
- | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Cys | Lys | Lys | Lys | Lys | Phe | Phe | Phe | Phe | Cys |
| 1 | | | | 5 | | | | | 10 |
- (21) INFORMATION FOR SEQ ID NO:20:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 12 amino acids
 (B) TYPE: amino acid
 (D) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:20:

Cys Lys Phe Leu Lys Phe Leu Lys Phe Leu Lys Cys
1 5 10

(22) INFORMATION FOR SEQ ID NO:21:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:21:

Val Lys Ala Leu Arg Val Arg Arg Leu
1 5

(23) INFORMATION FOR SEQ ID NO:22:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:22:

Lys Ser Leu Ser Leu Lys Arg Leu Thr Tyr Arg
1 5 10

(24) INFORMATION FOR SEQ ID NO:23:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:23:

Lys Val Arg Lys Ser Phe Phe Lys Val
1 5

(25) INFORMATION FOR SEQ ID NO:24:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:24:

Phe Leu Lys Pro Gly Lys Val Lys Val
1 5

(26) INFORMATION FOR SEQ ID NO:25:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 8 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:25:
- Lys Glu Leu Lys Arg Ile Lys Ile
1 5
- (27) INFORMATION FOR SEQ ID NO:26:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:26:
- Lys Trp Lys Ala Gln Lys Arg Phe Leu
1 5
- (28) INFORMATION FOR SEQ ID NO:27:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:27:
- Lys Trp Lys Ala Gln Lys Arg Phe Leu Lys
1 5 10
- (29) INFORMATION FOR SEQ ID NO:28:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 11 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:28:
- Lys Arg Leu Lys Trp Lys Tyr Lys Gly Lys Phe
1 5 10
- (30) INFORMATION FOR SEQ ID NO:29:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 13 amino acids
 - (B) TYPE: amino acid

- (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:29:
- Cys Gln Ser Trp Lys Ser Ser Glu Ile Arg Cys Gly Lys
 1 5 10
- (31) INFORMATION FOR SEQ ID NO:30:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 7 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:30:
- Cys Lys Phe Leu Lys Lys Cys
 1 5
- (32) INFORMATION FOR SEQ ID NO:31:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:31:
- Lys Thr Lys Cys Lys Phe Leu Lys Lys Cys
 1 5 10
- (33) INFORMATION FOR SEQ ID NO:32:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 6 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:32:
- Lys Phe Leu Lys Lys Thr
 1 5
- (34) INFORMATION FOR SEQ ID NO:33:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 (B) TYPE: amino acid
 (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:33:

Cys Lys Lys Leu Phe Lys Cys Lys Thr Lys
 1 5 10

(35) INFORMATION FOR SEQ ID NO:34:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 9 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:34:

Cys Lys Lys Leu Phe Lys Cys Lys Thr
 1 5

(36) INFORMATION FOR SEQ ID NO:35:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:35:

Ile Lys Thr Lys Cys Lys Phe Leu Lys Lys Cys
 1 5 10

(37) INFORMATION FOR SEQ ID NO:36:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 10 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:36:

Ile Lys Thr Lys Lys Phe Leu Lys Lys Thr
 1 5 10

(38) INFORMATION FOR SEQ ID NO:37:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 11 amino acids
- (B) TYPE: amino acid
- (C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:37:

Ile Lys Phe Leu Lys Phe Leu Lys Phe Leu Lys
 1 5 10

(39) INFORMATION FOR SEQ ID NO:38:

- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 7 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:38:
- Lys Phe Leu Lys Phe Leu Lys
1 5
- (40) INFORMATION FOR SEQ ID NO:39
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:39:
- Arg Tyr Val Arg Tyr Val Arg Tyr Val
1 5
- (41) INFORMATION FOR SEQ ID NO:40:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 9 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:40:
- Lys Phe Phe Lys Phe Phe Lys Phe Phe
1 5
- (42) INFORMATION FOR SEQ ID NO:41:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid
 - (C) TOPOLOGY: circular
- (ii) SEQUENCE DESCRIPTION: SEQ ID NO:41:
- Ile Lys Phe Leu Lys Phe Leu Lys Phe Leu
1 5 10
- (43) INFORMATION FOR SEQ ID NO:42:
- (i) SEQUENCE CHARACTERISTICS:
- (A) LENGTH: 10 amino acids
 - (B) TYPE: amino acid

(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:42:

Lys Lys Lys Lys Lys Lys Phe Leu Phe Leu
1 5 10

(44) INFORMATION FOR SEQ ID NO:43:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:43:

Cys Lys Phe Lys Phe Lys Phe Lys Phe Cys
1 5 10

(45) INFORMATION FOR SEQ ID NO:44:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 10 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:44:

Lys Trp Lys Ala Gln Lys Arg Phe Leu Lys
1 5 10

(46) INFORMATION FOR SEQ ID NO:45:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 11 amino acids
(B) TYPE: amino acid
(C) TOPOLOGY: circular

(ii) SEQUENCE DESCRIPTION: SEQ ID NO:45:

Lys Arg Leu Lys Trp Lys Tyr Lys Gly Lys Phe
1 5 10